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Prevalence of Overweight and Obesity in Chinese American Children in New York City

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Abstract Childhood obesity has been a growing concern in recent years. The extent of obesity in various ethnic pediatric populations including Chinese Americans has not been fully explored. In this study, the prevalence of overweight and obesity in a Chinese American pediatric population (6–19 years) was determined through a chart review of 4,695 patients from a large community health center in New York City. Demographic characteristics including sex, age and immigrant status were used in a logistic regression to determine risk factors for obesity in this community. Overall, 24.6% of the children studied were overweight or obese (defined as BMI $\geq$ 85th percentile for age and sex). Among US born boys aged 6–12 years, the combined prevalence of overweight and obesity was found to be as high as 40%. Further studies are needed to understand the complex interplay of factors that contribute to obesity in pediatric immigrant groups.

Keywords Childhood obesity · Prevalence · BMI · Chinese American · Asian American · Overweight

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Introduction

Childhood obesity is one of the fastest emerging epidemics in the US in recent years. The 2003–2004 National Health and Nutrition Examination Survey (NHANES)[1] found that 35% of children aged 6–19 years were overweight or obese (body mass index [BMI] $\geq$ 85th percentile or $\geq$ 95th percentile for age and sex, respectively), a three-fold increase since the 1980s [2]. The NHANES data showed this increasing trend as well as disparities among racial and ethnic groups. Nationally, an estimated 39.9% of Mexican American and 35.4% of non-Hispanic black children aged 6–19 years were found to be overweight or obese, compared to 28.2% of non-Hispanic whites [3]. The Youth Risk Behavior Surveillance System data showed similar patterns [4].

Asian Americans comprise 5% of the US population and make up one of the fastest growing ethnic groups in the US [5]. In national population-based survey studies such as NHANES however, this group often remains too small to be analyzed as a distinct ethnic category. The few studies on Asian American children have suggested that increasing rates of obesity are observed in this ethnic group as well. In a study of pediatric patients of community health centers, a high rate of 18% of obesity (BMI $\geq$ 95th percentile for age and sex) was demonstrated in Asian American children, aged 2–11 years [6]. The New York City Department of Health and Mental Hygiene estimated that 28% of all children, and 20% of Asian American children were overweight or obese in 2005, up from 26.8% to 13.4%, respectively in 2001. Asian American boys in particular showed a high prevalence of 25% [7]. In a study with a multi-ethnic seventh-grade population in southern California, a subgroup of Chinese American children showed a prevalence of 21.5% overweight or obesity [8].

Another study with a relatively small sample also demonstrated a very high rate of 33.8% overweight or obesity in Chinese American children aged 8–10 years [9].

Asian Americans are a highly heterogeneous group, both in terms of ethnic diversity and immigration experiences. As a result, the common practice of reporting the combined rates of overweight and obesity for Asian Americans as a single group often masks large intra-group variability. In a recent study with a nationally representative sample of Asian Americans adults, the prevalence of obesity ranged from 2.5% among Vietnamese Americans to 17.2% among Filipino Americans [10]. The same study also showed that 24.2% of third generation Asian Americans were obese compared to 6.9% of first generation Asian Americans in the sample. The National Longitudinal Study of Adolescent Health found a dramatic difference in overweight and obesity prevalence—11.6% in the first generation compared to 27.2% and 28.0%, respectively, in the second and third generations of Asian American adolescents [11].

The paucity of ethnic specific data on the Chinese American pediatric population motivated the launch of this study. The Charles B. Wang Community Health Center (CBWCHC) is a community-based primary health care facility partially funded by the Health Resources and Service Administration to deliver health care in the low-income, medically underserved Chinese immigrant community of New York City (NYC). With clinics in lower Manhattan and Queens of NYC, the CBWCHC in 2007 served over 7,000 children aged 6–19 years, the majority of whom were living at or below the federal poverty line. Because of its service coverage in the community, CBWCHC is well-positioned to assess childhood obesity rates in the NYC Chinese American pediatric population. This study aims to provide baseline prevalence of overweight and obesity in this community by basic demographic variables such as sex, age, and birthplace, and to assess whether Chinese American children, like children of other ethnic populations, also are at risk for childhood obesity and its associated long term health complications.

Methods

We reviewed medical charts of Chinese American children and adolescents aged 6 to 19 years who received annual preventive care in the year 2004 at two pediatric sites of CBWCHC, one located in Chinatown in lower Manhattan and another in Flushing, Queens of New York City. We chose to limit our data collection to this age group in order to obtain age group-specific prevalence that could be easily compared to the NHANES study [3] which reported childhood obesity data in this age range. The study was approved by the New York Downtown Hospital Institutional Review Board.

As part of annual health visits, height and weight measurements for all children and adolescents were routinely collected and entered into the patients' medical charts by the CBWCHC nursing staff. For this study, the study team created a standardized abstraction form in Microsoft Excel accompanied by detailed instructions to extract clinically measured weight and height from the charts, as well as age, sex, ethnicity, US vs foreign born, and insurance status. Three medical and college students were recruited as research assistants and trained to follow the chart abstraction procedure to gather data. No interpretation of data was required in the extraction of the data from the charts. Quality control procedures were used to optimize the completeness and accuracy of the data. Errors were identified and corrected during each step of creating and analyzing the database.

BMI is defined as weight (in kilograms) divided by the square of height (in meters) [12]. In our study, the BMI and BMI percentile were calculated using the 2000 US Centers for Disease Control and Prevention (CDC) Growth Charts [13] and the CDC Child and Teen BMI Calculator. Based on the 2007 Expert Committee Recommendations, obesity was defined as $\geq$95th BMI percentile, and overweight was defined as $\geq$85th BMI percentile and $\leq$94th BMI percentile for age and sex [12].

Patient data were imported from Excel into SPSS version 12.0 for analysis. Categorical data were presented in frequency distribution, and continuous variables were summarized as means and standard deviations. Crude odds ratios were calculated to compare the prevalence of overweight and obesity across key demographic subgroups, and adjusted odds ratios were calculated using logistic regression.

Results

A total of 4,907 charts were reviewed. Charts of patients who were non-ethnic Chinese (195) or outside the age range of 6–19 years (17) were excluded, resulting in a sample of 4,695 charts for analysis. Valid weight and height measures were present in 100% of the charts reviewed.

The sample consisted of approximately equal numbers of male and female subjects, and had an average age of 12.3 years (SD = 3.85). Slightly more than half of the subjects were born in the US. Of all subjects in this sample, nearly 94% were insured under Medicaid or New York's State Child Health Insurance Program (SCHIP), 3.7% were uninsured and 2.5% had private insurance. Table 1 summarizes these sample characteristics.

Table 1 Characteristics of subjects ($n = 4695$)

Subject characteristics	No. of subjects (%)
Sex	
Female	2244 (47.8)
Male	2449 (52.2)
Unknown	2 (0.0)
Age (mean = 12.3, SD = 3.85)	
6–11 years	2055 (43.8)
12–19 years	2640 (56.2)
Born in the US	
Yes	2604 (55.5)
No	2066 (44.0)
Unknown	25 (0.5)
Health insurance	
Medicaid	3814 (81.2)
Child Health Plus	580 (12.4)
Private	117 (2.5)
None	175 (3.7)
Unknown	9 (0.2)

Of the entire sample, 24.6% of the subjects were found to be overweight or obese, consisting of 14.4% overweight and 10.2% obese. The breakdown by the various demographic characteristics is shown in Table 2. Insurance coverage was excluded from further analysis because the distribution was heavily skewed towards government health plans (94%). Table 3 presents the crude and adjusted odds ratios, estimated using logistic regression, for being overweight or obese. The odds of being overweight or obese for boys were more than twice as great as they were for girls (aOR, 2.43; 95% CI, 2.11–2.80). The younger cohort (aged 6–11 years) in the sample had higher risk (aOR, 1.53; 95% CI, 1.33–1.77) than the older cohort (aged 12–19 years) for being overweight or obese. Finally, being born in the US was also independently associated with increased risks for being overweight or obese (aOR, 1.73; 95% CI, 1.49–2.01).

Discussion

This study is one of the first to present, on a large scale, baseline data on the prevalence and associated demographic characteristics of overweight and obesity in a Chinese American pediatric population. Overall, 24.6% of 4,695 Chinese American children were found to be overweight or obese (Table 1). Although this proportion was smaller than that in the general US pediatric population (31%) [3], it is nevertheless a high rate. Furthermore, disaggregated data revealed substantially higher prevalence in the boys aged 6–11 years and among those who are US born. In fact, 40% of the US born boys aged 6–11 years in this study were identified as overweight or obese. This percentage is alarmingly high, and is approaching those seen in other minority populations including Mexican American children (43.9%) [3], a group currently ranking as the most overweight in the US.

Similar to other studies conducted on ethnic Chinese children [14–16], our study demonstrated that boys were about twice as likely to be overweight or obese as girls (32.1% vs 16.5%). It is noteworthy that this particular gender disparity was distinct from the disparities that have been found in other racial and ethnic groups. According to the most recent NHANES data [3], gender differences were

Table 2 Prevalence of overweight and obesity among CBWCHC's Chinese American pediatric patients by sex, age, and birth of place ($n = 4695$)

Sex	Age (years)	All		*Place of birth (US vs Foreign)*			
				US born		Foreign born	
		Overweight or obese, [a]No. (%)	Obese, [b]No. (%)	Overweight or obese, [a]No. (%)	Obese, [b]No. (%)	Overweight or obese, [a]No. (%)	Obese, [b]No. (%)
All	All	1150 (24.6)	477 (10.2)	776 (29.8)	347 (13.3)	374 (18.1)	130 (6.3)
	6–11	630 (30.8)	293 (14.3)	491 (32.8)	235 (15.7)	139 (25.3)	58 (10.5)
	12–19	520 (19.8)	184 (7.0)	285 (25.7)	112 (10.1)	235 (15.5)	72 (4.8)
Boys	All	782 (32.1)	349 (14.3)	507 (37.4)	242 (17.9)	275 (25.4)	107 (9.9)
	6–11	424 (38.7)	210 (19.2)	322 (40.0)	165 (20.5)	102 (35.1)	45 (15.5)
	12–19	358 (26.7)	139 (10.4)	185 (33.6)	77 (14.0)	173 (21.8)	62 (7.8)
Girls	All	368 (16.5)	128 (5.7)	269 (21.5)	105 (8.4)	99 (10.1)	23 (2.3)
	6–11	206 (21.7)	83 (8.7)	169 (24.5)	70 (10.1)	37 (14.3)	13 (5.0)
	12–19	162 (12.6)	45 (3.5)	100 (17.9)	35 (6.3)	62 (8.6)	10 (1.4)

[a] Overweight or obese: BMI of ≥85th percentile for age and sex based on the 2000 CDC growth charts

[b] Obese: BMI of ≥95th percentile for age and sex based on the 2000 CDC growth charts

Table 3 Odds ratios for overweight and obesity among CBWCHC pediatric patients ($n = 4668$)

Subject characteristics	Overweight or obese, [a]BMI ≥ 85th percentile		Obese, [b]BMI ≥ 95th percentile	
	OR (95% CI)	aOR* (95%CI)	OR (95% CI)	aOR* (95% CI)
Sex				
Female	1.00	1.00	1.00	1.00
Male	2.39 (2.08–2.75)	2.43 (2.11–2.80)	2.75 (2.22–3.39)	2.77 (2.23–3.42)
Age				
6–11 years	1.80 (1.57–2.06)	1.53 (1.33–1.77)	2.22 (1.83–2.69)	1.82 (1.48–2.23)
12–19 years	1.00	1.00	1.00	1.00
Born in the US				
Yes	1.92 (1.67–2.21)	1.73 (1.49–2.01)	2.29 (1.85–2.82)	1.94 (1.55–2.42)
No	1.00	1.00	1.00	1.00

Abbreviations: OR, odds ratio; aOR, adjusted odds ratio; CI, confidence interval

[a] Overweight or obese: BMI of ≥85th percentile for age and sex based on the 2000 CDC growth charts

[b] Obese: BMI of ≥95th percentile for age and sex based on the 2000 CDC growth charts

* Adjusted for all variables listed

only noted in non-Hispanic blacks aged 6–19 years, among whom girls were more likely than boys (40% vs 31%, respectively) to be overweight or obese. These findings suggest that it may be important to explore the role of gender in influencing overweight and obesity in different ethnic groups.

Acculturation and the adoption of mainstream US lifestyles have been implicated as major contributors to increased obesity among Asian immigrants [10, 11, 17]. Asians born in the US were four times more likely to be obese than their foreign born counterparts [17]. Also, among the foreign born, more years lived in the US were associated with a higher risk of being overweight [10, 17]. Our data showed similar patterns in that US born Chinese American children were more likely than those born in Asia to be overweight or obese. These findings raise concerns in communities with large proportions of immigrant and first generation children as there may be greater increases in overweight and obesity in the coming years compared to the rest of the country. Similar to the recent NHANES data [3], our study shows higher rates of obesity in children aged 6–11 years (31%) than in adolescents aged 12–19 years (20%), which also resembles those reported in studies on ethnic Chinese pediatric populations outside the US. Since overweight children, both in China and in the US, have been found to be at much greater risk than normal weight peers to become overweight adults [18, 19], the growing rates of obesity among adults in this ethnic group are likely to persist and worsen in the decades to come.

Our study used the definitions for overweight and obesity set forth by the 2007 Expert Committee Recommendations [12] which are based on BMI percentiles developed by the National Center for Health Statistics (NCHS) [13]. BMI is a convenient, practical and widely accepted screening tool for measuring overweight and obesity. It is worth noting, though, that some studies on Asian populations have shown that applying the US age and gender specific BMI cutoffs to children of Asian descent may underestimate the prevalence of clinically significant obesity in these groups [14, 20]. Among Asian adults in the US, having BMI values as low as 25 has been associated with increased rates of obesity-related disorders [21, 22], possibly due to the higher body fat ratio relative to BMI found among Asian populations [22]. Therefore, for the Chinese American pediatric population, it may be important for clinicians to consider additional information such as family history, growth patterns, and health behaviors to fully assess overweight and obesity.

There are limitations inherent in the design of this study. First, the cross-sectional design did not allow for causal inference. For example, the apparent association between immigrant status or age and being overweight should not be interpreted as a causal relationship. Second, since the study subjects were drawn from pediatric patients of one health center, the present results may not generalize to other Chinese American communities. Third, data on numbers of years lived in the US were not available, thus limiting our ability to use this important surrogate for acculturation. Finally, because of the large variation in immigrant experiences, place of origin, and social status, caution should be exercised when extrapolating the study findings to the Chinese immigrant community at large. Despite these limitations, this study provides critical baseline data important for community-level monitoring of overweight and obesity, and for longitudinal evaluation of obesity prevention and management programs for Chinese American children in NYC.

The current data have confirmed the need to take action to educate the community about the urgency of the problem of childhood obesity. At CBWCHC, culturally and linguistically appropriate health education pamphlets have been developed. The scope of the obesity problem at CBWCHC has necessitated a multidisciplinary team-based approach using principles of the Chronic Care Model to better diagnose and manage this complex public health concern [12]. Continued monitoring and tracking of this condition are essential, as are collaborations with other Asian and non-Asian communities to fully investigate the complex web of physiological, behavioral, and environmental influences affecting obesity in our children.

Conclusions

This study found a high prevalence rate of overweight and obesity in Chinese American children at a large community health center. Even within this relatively homogeneous population, there was a wide range in the prevalence rate with the highest rate found in US born boys aged 6–11. These findings suggest the need for in-depth investigation of the familial, social, gender and acculturational influences on overweight and obesity. Additionally, it is important to understand the interplay of neighborhood and the broader environmental influences that contribute to the pediatric obesity problem. As with other chronic conditions, emphasis on prevention and the development of culturally appropriate and effective interventions may be critical to reversing the trend.

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